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ABSTRACT

As part of the efforts of the Office of Educational Research and Improvement (OERI) in support of the national goals for education (America 2000), staff members are cataloguing and synthesizing research to connect it to federal practice. This paper presents the basic argument that synthesizing research and translating it into practice-oriented language are activities that construct new meanings from a body of knowledge. Those who receive the results of the synthesis and translation activities also construct meaning, and they do so in the multiple communities of school and classroom life. For those who receive research-based knowledge, information is only one type of knowledge influencing the actions of teachers, principals, parents, and others who deal directly with children. The contexts to be affected by research findings are complex and lead to multiple and sometimes competing understandings. An alternative perspective on synthesis and translation shifts the focus to a user construction that sees information as something to be molded and shaped by the perceiver. Seeing the task in this light could affect the way the OERI approaches the activity and the ways in which it identifies gaps in existing knowledge. There is a 49-item list of references. (SLD)

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Synthesis and Translation: Will It Be Easier For Users To Discover Meaning, Truth, and Utility In Research?

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The Office of Educational Research and Improvement (OERI) has undertaken a large task to support achievement of the national goals for education.[1] Staff, organized into cross-program work groups, are cataloguing and synthesizing research, federally sponsored, to connect it with educational practice. The connection will, it is posited, assist in meeting the goals. Further, the exercise is designed to identify important gaps in the research base and direct future federal research programs to filling those gaps. The task is, indeed, challenging, particularly when the timeline for achieving the goals is relatively short the year 2000.

Synthesizing and translating research into practical terms is, in itself, a complex matter. The discussion presented in this paper is confined to synthesis and translation issues. However, it is based on the assumption that synthesis/translation activities are not enough, and a "research into practice" enterprise requires human and organizational support, as well as information. Huberman's commentary, which follows, addresses those issues.

The paper is organized as follows. First, the paper presents the basic argument that synthesizing research and translating it into practice-oriented language are activities that construct new meanings from a body of knowledge. Synthesis is a creative activity. In addition, meaning, truth, and knowledge are socially constructed within the communities in which individuals live. For the purposes of this paper, "community" is taken to mean: "patterned social interaction...and/or any unit of collective identity" (Louis, 1990, p. 30). Given these definitions, we all live in multiple communities, which makes the constructing process of meaning complex. Finally, those who receive the results of the synthesis/translation activity also construct meaning, and they do so within their multiple communities.

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[1] The national goals are:

By the year 2000:

1. All children in America will start school ready to learn.
2. The high school graduation rate will increase to at least 90 percent.
3. American students will leave grades four, eight, and twelve having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment in our modern world.
4. U.S. students will be first in the world in science and mathematics achievement.
5. Every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship.
6. Every school in America will be free of drugs and violence and will offer a disciplined environment conducive to learning.

The second section of the paper presents a picture of the reality of school and classroom life; that is, the multiple communities within which those who will the receive research-based knowledge live. The key messages of this section concern the fact that information is only one type of knowledge influencing the actions of teachers, principals, parents, and others who deal directly with children. Further, the contexts that are supposed to be affected by the findings of research are complex and varied and lead to multiple, and sometimes competing, understandings. Finally, the nature of the practical world of education has built-in barriers to social constructions of *new* realities.

The paper concludes with an alternative perspective on synthesis and translation and recommendations for the OERI synthesis process.

The Construction of Meaning

It is popular these days to view children's learning from a "constructivist" perspective (Champagne & Klopfer, 1984; Confrey, 1990; Putnam, et al., 1990). Constructivists view the learner as an active creator of knowledge: "Central...is the assumption that individuals interpret their environments through existing cognitive structures built up through adaptation to the environment" (Putnam et al., 1990, p. 87). If such cognitive structures exist for children, they surely exist for adults. Perhaps more important than positing the existence of structures that help people make sense of the world is understanding how they are built.

Individuals' interpretations of their environments, including new information they receive, builds the reality they experience. The process is iterative–each individual has a framework for understanding the world; he or she has new experiences or receives new information, which either fit into or cause modification of the framework; the interpretation of reality (its "meaning") is either confirmed or changed; and the new reality is the framework or lens for understanding the world. There is, of course, a tendency to see even new information as confirming existing understanding. In part, that is because the framework, the construction of reality, is social (Berger & Luckman, 1967) and occurs in interaction with the communities in which we live, and all communities tend to conserve their understanding of the world. In Blumer's words (1969), we take meaning from the situations we encounter, and those meanings both frame and are framed by the structures learned from our social settings.

Two issues complicate the "social construction of reality" (Berger & Luckman, 1967). First, each of us participates in many communities, and second, most of the communities in which we live embody different (and sometimes competing) sets of values, interpretations of reality, and goals. For example, OERI staff, who are engaged in the synthesis task, view the world through lenses constructed through interaction in a variety of communities. Many are parents, whose views of what research means to practice are influenced by their aspirations for their own children and their understanding of what the children experience in school. In addition, all staff members are professionals, and the accumulated "wisdom" of their profession creates lenses through which they interpret the research. They also are public servants, and their interpretation of the meaning of that role influences how they view the research and the synthesis task. Finally, they are influenced by the geographic community in which they reside, concepts and values taught by their families, the political realm, and the world of the arts. In short, they are full human beings living in a complicated world.

If the multiple communities in which we participate and construct meaning did not create enough complexity, we need also to consider that few of these communities offer single and coherent constructions of reality. As parents, for example, we simultaneously want our child to understand himself or herself as a unique individual and as sharing characteristics with those in his or her ethnic group. Teachers simultaneously view their teaching as developing the inherent qualities of the students and ensuring that students learn content defined as important by others. These alternate, and sometimes conflicting, views present a series of dilemmas (Cuban, 1991; Berlak & Berlak, 1981) that we can address but never solve. The ways we address the dilemmas, both cognitively and in action, frame our understanding of the world and, therefore, our actions.

These complexities in the construction of meaning apply both to the synthesizers and the intended audiences for the outcomes of the synthesis process. The following sections focus on the synthesis activity, first by establishing that synthesis itself is a constructive, creative task; and second, by characterizing the communities involved in the synthesis activity.

Synthesis As Construction of Meaning

Einstein once said: "Science is not just a collection of laws, a catalogue of unrelated facts. It is a creation of the human mind, with its freely invented ideas and concepts. Physical theories try to form a picture of reality and to establish its connection with the wide world of sense impressions." (Einstein & Infeld, 1938, p. 294, cited by Confrey, 1990, p. 25). The synthesis task OERI has currently undertaken has two parts which encompass both a catalog and picture of reality. The

"catalog" is of current OERI and other federally funded work relevant to the goals. Unlike the catalog of unrelated facts Einstein notes, the OERI catalog has an organizing principle–the achievement of the national educational goals. The "picture of reality" is what we know and don't know about creating the conditions that will enable us to reach the goals.

As Rich (1983) puts it, "Knowledge synthesis refers to *organizing* a large body of information, *summarizing* it, and *transforming* it into a usable form" (p. 307, Author's emphasis). The transformation process is the process of creating meaning. Dervin's view (1983) is that synthesis and translation "pull out from the literature 'state-of-the-art' generalizations, isolate areas where generalizations cannot be made, and draw conclusions about the implications for practice" (p. 155).

Research synthesis for any purpose, but particularly to achieve practical objectives, often confronts conflicting findings. A variety of ways of dealing with conflicting findings exist, including technical approaches (Slavin, 1986), building consensus (Rich, 1983), and "voting" (Klein, 1989). Whatever method is used, the result is **something different** from the individual studies comprising the basis of the synthesis. In short, the result is a new construction of reality.

The new construction of reality can be viewed from two perspectives. First, it can be seen as the assertion of some sort of greater "truth" than embodied in individual studies, focusing on increasingly universal "propositional knowledge" that predicts the effects of actions or treatments (Huberman, 1987; Goldenberg & Gallimore, 1991). In that view, logical and compelling recommendations for action are fairly universally applicable. Alternatively, the synthetic construction of meaning can be understood to result from a particular context and the interaction of particular individuals representing particular communities. If this contextualized perspective is taken, the recommendations for action are not seen as universal, but rather as requiring adaptation to various settings by the individuals within those settings.

Because this paper takes the second, contextualized perspective, it is necessary to discuss the context of the synthesis activity and the contexts into which its outcomes will be disseminated. The following section addresses the context in which the syntheses and translations are developed. A later discussion of the realities of schooling focuses on the contexts into which they will be disseminated.

The Context For Synthesis

This section of the paper addresses the context in which the synthesis activity occurs. It asserts that the attempt to connect research with the achievement of the national goals is a political activity. The political nature of the activity is intertwined with the tactics selected to synthesize and translate research. The tactics to be discussed are the confinement of the research base being considered mainly to federally funded research and the implementation of the synthesis activity by OERI staff. The implications of using those tactics will be analyzed.

The establishment of six national educational goals is, in the broadest sense, a political statement. The involvement of the 50 governors demonstrates that it is an attempt, however adequate, to articulate a national consensus about what education should accomplish. Within a democratic society, it is appropriate for the public, through its elected representatives, to state goals for a major socializing enterprise, particularly one largely supported through public dollars. The particular goals espoused represent a response to the contemporary national context. For example, the sixth goal ("Every school in America will be free of drugs and violence...") is a direct response to concerns about the safety of our children in school and what is viewed as an epidemic of drug use. The articulation of the goals themselves is a response to a perceived crisis in American education, which is occurring concurrently with general economic hard times. The goals, then, are a means of responding to a perceived crisis without mounting programs that cost money.

The broad political context, which influences how all communities in the United States construct meanings, influences the meanings derived from the research base. Further, the research base that is to be synthesized is fairly limited, including mainly federally funded work. Bounding the task in this manner is understandable, both conceptually and practically, but it has effects on the outcome. At best, it may exclude knowledge that would help resolve some conflicting findings. At worst, it makes a statement about what research is worthy of consideration, and it can create an incorrect image of convergence in a field. Alternative perspectives, particularly those from individuals whose work lies outside the political and educational research mainstream, will not be included in the syntheses.

That absence is exacerbated by relying on agency staff, who are less likely to interact regularly with non funded researchers than are professionals outside the government. The communities in which OERI staff members interact, and from which they construct meaning, are almost infinite, including family, neighborhood, and professional groups. For the purposes of this

paper, however, the discussion will be limited to three communities: the community of the civil service, the educational community in general, and the educational research community.

That the creators of the syntheses around the national goals are civil servants is significant. The OERI synthesis strategy draws on agency personnel members, who are employees of the executive branch of the government. An alternative would be to draw upon "the field"–to bring together the authors of the research in each goal area and ask them to do what agency staff members are currently doing. I realize that working as contractors or grantees only removes researchers one step from the government, but that step involves geographic distance and daily interaction with non federal employees. Federal employees, in contrast, live life "inside the Beltway" and interact mainly with others whose core concerns are developing and implementing policy, and, in the case of OERI, translating policy into a professionally defensible program of educational research, development, demonstration, and dissemination.

The last set of concerns exists because OERI employees are members of the educational community and, within it, of the community of educational researchers. Consequently, their meanings are influenced by the values, beliefs, and understandings of educators. Within these communities there are "models of the universe, as well as 'correct' methods for uncovering truth" (Perdue, 1986, p. 7). Through social interaction, including training programs and professional associations, the frameworks and lenses are shared. As noted above, educators–and even educational researchers– do not comprise a unitary community nor have a unitary construction of reality.

Within OERI there are those who identify more closely with the world of practice than with the world of research. Further, the differences within the educational research community are clear to anyone who reads the American Educational Research Association (AERA) program carefully. Our community includes critical theorists, deconstructionists, phenomenologists, constructivists– and even a few remaining logical positivists. Although the range of perspectives within OERI is likely to be less broad, it is unlikely that there is a single vision.

OERI staff members, who themselves embody a variety of perspectives, are faced with synthesizing research generated by different questions, using different methods to arrive at answers, and different rules of evidence. However, as noted above, there are limits on the research perspectives legitimated for the activity simply because the research base is limited to federally funded research. Most of that research informs only what Cuban (1988) calls "first-order changes," "ways of making schools and classrooms more effective and efficient." Some research

addresses the "second-order changes," "altering the fundamental ways in which organizations are put together, including new goals, structures, and roles" (Fullan, 1991, p. 29). But very little speaks to the continuing existence of hierarchical social structures and processes (Ayers, 1991), what might be called "third-order changes."

The primary focus on first- and second-order changes is built into the nature of the task itself. That is, the OERI staff is synthesizing research to create "a clearly framed statement of findings and critical understandings, which, if acted upon, could help schools and communities take measurable strides toward achieving [a] particular goal" (Ravitch, 1991). The assumption is that research (as federal employees interpret it) goes to practitioners. Frequently, the phrasing of such flows is even more revealing: "Let's get research **down** to the classroom."

Whatever set of lenses the synthesizers wear, the view from OERI (and probably from all research), is different from the view from the classroom. Researchers are far more likely to pursue explanatory theories than practical theories (Strike, 1979), while those in schools are more likely to want information that helps them get "the world to correspond to their intentions" (Huberman, 1983, p. 481). The world in which practice occurs is varied, as are the values and intentions of those who occupy it. The next section provides a picture of the variety of settings that the synthesis/translation process is designed to influence.

The World of Practice

One purpose of the OERI synthesis/translation activity is to produce research-based recommendations for action to assist in achieving the national goals. Clearly, the activity is being implemented for practical reasons. However, there are limitations to the influence of research, even of translated research, on schools and other arenas of practice. The limitations result from the nature of the practical world. This section describes some salient features of that world and the potential influence of research on it. It looks first at types of knowledge and the bases for judging truth used by teachers, parents, administrators, and others centrally concerned with practice. Second is a brief discussion of the varieties of communities that frame the social construction of knowledge within the practical world and the resultant range of understandings upon which action is based. The section then presents a discussion of individual, community, and organizational barriers to building new constructions of reality within the educational context.

Types Of Knowledge

Three types of knowledge will be discussed: subject matter knowledge, knowledge drawn from educational research, and knowledge of the local context. Teachers act on all three types of knowledge from day to day and minute to minute. The influence of the OERI syntheses will be limited because at best they address only part of how teachers construct reality, through educational research knowledge.

The following discussion focuses primarily on teachers. However, the same issues arise with regard to parents, administrators, policy makers, and community members. The discussion is limited to teachers to simplify the analysis of the world of practice. It is important, however, to emphasize that the magnitude of the complexities identified here could be multiplied many times.

Subject matter knowledge. According to Shulman (1987), "The first source of the knowledge base is content knowledge–the knowledge, understanding, skill, and disposition that are to be learned by school children" (pp. 8-9). This encompasses not only knowledge of "facts," e.g., who got elected when in history or who wrote what in literature, but also "ideas about the ways in which 'truth' is determined in a field" (Shulman, 1987, p. 8). The knowledge of subject matter is important both in the basic skills and in more advanced content areas.

Perhaps the most problematic issue in subject matter knowledge is deciding what content, in any field, is important to teach. The professional communities to which teachers belong contribute to the construction of reality and the resulting inclusion and exclusion of content. For example, the National Council of Teachers of Mathematics (NCTM) has developed and publicized a set of curriculum standards for school mathematics (1989). The standards embody new conceptions of mathematical content and emphasize constructivist principles of learning. As teachers become aware of the new professional consensus of what it means to teach and learn math, they will incorporate that construction in some way in their view of what is important to teach. (Acting on the view may be another matter as explained below.)

Goal Three and the NCTM standards focus on developing "higher-order thinking skills." The very meaning of higher-order thinking skills varies among users. For some, it means applying a set of fairly standard tools to a problem (Glatthorn & Baron, 1985). For others, it includes "understanding the limits of knowing, as in particular subject matter" (Presseisen, 1985, p. 48). These meanings are embedded in curricula and the pedagogy teachers employ. Historically, teachers have relied primarily on direct and didactic instruction. In part, that results

from their understanding of how schools are "supposed" to be and how children learn, both of which are rooted partially in their reconstructions of how they themselves learned (Richardson-Koehler & Fenstermacher, 1988). The constancy of classroom practice (Cuban, 1988) is related to a perspective that knowledge itself is constant–there may be more to learn as time goes on, but additional knowledge is qualitatively like that which went before.

The view of higher-order thinking skills as including questions about the limits of knowledge appears most clearly in content fields in which there is no consensus of what is important to teach or the grounds for determining "truth" in the field. Current debates over multicultural education and the broadening of the literary canon, for example, focus on these matters. Individual and school resolutions of the debate depend on three sets of understandings: what is seen as important in the subject matter, how the goals of education are construed, and perceptions of the nature and needs of the local context. There are, of course, multiple perspectives on each of those issues as well, and teachers, as members of multiple communities, will construct the "ideal" curriculum in various ways. However, the very existence of a debate over what *should* be included in the curriculum renders problematic what might once have been settled. And teachers who see subject knowledge as problematic are more likely to open their classrooms to analytic and critical thinking than those who do not.

Knowledge of research. Teachers act on their understandings of the meaning of research. Research-based knowledge becomes part of the discourse of the teaching community in a number of ways, some of which are addressed by current OERI activities and programs. The paths for entering include preservice education, staff development for experienced teachers, state-mandated teacher evaluation procedures, teacher-oriented journals and newsletters, and innovative educational programs that embody "elaborated sets of procedures and practices" (Huberman, 1983, p. 480). However it enters the setting, it is one type of knowledge creating teacher understanding and action.

Educational research, as we have seen, does not provide easy translation into action. In part, this results from its decontextualized nature, which emphasizes "all other things being equal" (Goldenburg & Gallimore, 1991). When teachers encounter research, they tend to judge its utility and worth "against whether it 'fits' or 'feels right'" (Huberman, 1983, p. 481) and whether it comes from a source they trust (Hood and Blackwell, 1976). According to Lortie (1975), teachers are more apt to seek assistance from peers than from "research" because the peers are likely to share experiences (and understandings). In short, teachers mediate propositional knowledge through their understandings of the settings in which they act. As Huberman (1983) says:

> The global image... of knowledge use by teachers is that of practically oriented professionals drawing chiefly on their own and their peers' experience to resolve problems or otherwise modify their instructional practices. Recourse to more scientific, distant, or noneducational sources is infrequent, with the exception of magazines and reference materials to which teachers have easy access. There is a good deal of recipe collecting and exchanging, enabling teachers to expand their instructional repertoire....These recipes are traded on the basis of a validation that is craft embedded and highly experiential...(p. 483)

Certain school contexts are more conducive to the use of research knowledge than are others. Little (1982) characterized improving schools as those with teachers who talked about teaching, were the site of much observation and discussion about what was observed, and that focused on instructional materials and practices involving the creation of a shared language between teachers and administrators. According to Newmann (1991), "A culture of communal professionalism nurture(s) the will and skill of teachers to teach effectively" (p. 24). Goldenburg and Gallimore (1991) posit "very likely the prospect of reforming schools depends on a better understanding of the interplay between research knowledge and local knowledge" (p. 2).

Local knowledge. A third type of knowledge that influences teacher action is knowledge of the local setting. Local knowledge includes such matters as understandings of the culture and mores of the school and district, perspectives on the particular students who are in a class, interpretations of what curriculum objectives the community embraces, and definitions of appropriate pedagogical techniques. It includes "practical knowledge...gained through experience with the cyclic nature of schooling and classroom life" (Clandinin & Connelly, 1986, p. 380).

Teachers' local knowledge comes from their membership in the community of the school. Consequently, school culture plays an important part in framing how teachers interpret their surroundings. The research on schools as workplaces (Rosenholtz, 1989) contributes to our understanding of "the role of teachers in socially constructing conditions of the workplace" (McLaughlin & Talbert, 1990, p. 6). For example, in some schools teacher contributions to school wide problem solving is valued, while in others decision making is seen as coming from the top. Some schools are located in states in which there is a great deal of central control, others in states with local control. Teachers' views of their appropriate roles in each of these conditions are different, and they are likely to act on those understandings differently. Further, the different constructions have an influence on whether and how teachers will use research-based knowledge.

McLaughlin and Talbert also maintain that "teachers' experiences of their work environment and the context factors that shape the meaning of teaching are not confined by classroom doors and

school fences" (p. 6). Teachers also are parents, live in neighborhoods, and are members of professional organizations. These communities also frame how teachers construct the reality of their daily lives.

Conclusion. Teachers construct the reality of their work from a number of realms of knowledge, three of which have been discussed here. As they teach, they act on their construction. Shulman's (1987) view is that teachers "transform the content knowledge [they] possess into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by the students" (p. 15). Not only variations in students influence the transformation, but also variations in a number of aspects of the work environment and the school culture.

Complexity And Variety Of Contexts

The OERI synthesis/translation product will be disseminated to teachers and others who live and work in a variety of settings. Not only do those settings house communities that influence how teachers construct their realities, but they also are complex and varied. This section lays out two aspects of the complexity and variety, school level and student differences, to establish that there are multiple, and sometimes competing, understandings that will influence the utility of the synthesis product.

Elementary, middle, and high school. The clearest structural differences in the contexts in which teachers work lie in the differences among elementary, middle, and high schools. Contextual differences in these settings, including the major organizing principles and goals and degree of consensus about them, influence teachers' perspective about research.

Elementary schools are mainly organized by grade level, with teachers who are considered and who consider themselves to be generalists. According to Honig (*Caught in the Middle,* 1987), students in the elementary years experience "a world organized by the teacher" (p. v). High schools, in contrast, are largely organized around subject matter, and "subject area is a primary nexus of high school teachers' professional training and identity and of their collegial relations inside and outside the school setting..." (McLaughlin & Talbert, 1990, p. 7). Middle schools are, in the words of a California study group, "caught in the middle"–sharing some characteristics with elementary schools, particularly when there are "extended blocks of instructional time in selected core curriculums taught by individual teachers or teams of teachers" and some with high schools, when there are "specialist teachers [teaching] the remaining core curriculum subjects as well as

elective and exploratory curricula" (*Caught in the Middle,* 1987, p. 92). In brief, the differences between the perspectives of elementary and secondary teachers can be captured by the clichéd characterization of each–the elementary school teacher teaches children; the secondary teacher, a subject; and the middle school teacher teaches both.

The three levels of schooling also differ in the goals they espouse and the degree of consensus about those goals. For example, although not absolute, it is more widely agreed in the elementary school that the goal is to provide students with the "basic skills," particularly when those skills are interpreted to include some level of critical thinking (McTighe & Schollenberger, 1985). In contrast, there are multiple goals at the high school level–to prepare students for college, to prepare students for immediate employment, to prepare students for citizenship. The California High School Task Force acknowledges this lack of consensus:

> Up until now, there has been little consensus on what constitutes a meaningful or worthwhile curriculum for high school students, except for those who decide on a college preparatory course of study. To respond to the diversity among students and the lack of consensus on a curriculum, schools provide academic and vocational education; and remedial, nonacademic, and vocational courses. (*Second to None: A Vision of the New California High School,* 1992, p. 22)

And, although these goals can be conceptually reconciled, they seldom are in practice (Powell, Cohen, & Ferrar, 1985). According to Honig:

> The first challenge for schools which enroll middle grade students is to make sure that they are "connected" to the goals and purposes of their schools in positive ways, and have an opportunity to increase their self-esteem...Middle grade schools must provide students with a caring transition as they move from elementary to high school. The second challenge is to prepare students for academic success in high school. (*Caught in the Middle,* p. vi)

These differences influence how teachers relate to one another, the communities they identify with, and the issues of central concern to them. For example, high school history teachers will, in all likelihood, interpret the meaning of the part of Goal Three relating to history and geography differently from middle school teachers, who are more likely to be teaching "social studies." But the content area community is not the only community in which high school teachers live. They also are part of the teacher community in the school in which they teach. Consequently, they build meaning about the students and the possible outcomes of schooling with that group, as well as with the smaller departmental group. A major influence on the construction of reality at the school level is teachers' understanding of and interpretation of the nature of their students and their likely adult fates.

Perspectives on students. How teachers use information depends, in part, on how they view their students and what they see as the latters' probable life outcomes. Differential perspectives on students generated by understandings of race, social class, and gender influence how teachers integrate new information into their construction of reality.

Oakes (1990) has demonstrated that "Assessments of academic ability, placement in different tracks or ability-grouped classes, and the reduced educational opportunities that characterize low-track classes often parallel race and social class differences" (p. vi). This affects the educational challenges offered to minority and poor children within schools serving diverse student bodies. In addition, in schools serving largely poor and minority students, the entire curriculum is less challenging in part because "disproportionate percentages of teachers judge their science and mathematics students to have low ability" (p. vi). Information about how to become "first in the world" in science and mathematics, therefore, will be interpreted differently by teachers of the educationally disadvantaged from the interpretation given by teachers of those who are educationally privileged. Consequently, the information must address perspectives, as well as techniques.

The pervasive importance of the meanings ascribed to students' social class is underscored by Metz's study (1990) of "social influences that shape high school teachers' perspectives, goals, experiences, and practices" (p. 41). In a school serving a high socioeconomic community, "Most of the faculty accepted much of the community's definition of school knowledge as technical and highly skill oriented. They also saw their relations with students as hierarchical ones, where they were experts supervising the acquisition of skills" (p. 55). Teachers in a working-class school shared the view of knowledge as the acquisition of information and skills, but also focused on the importance of teaching "obedience and hard work as values" (p. 67). Differences among faculty existed and were related to identifying with communities within the larger school community and the life experiences of individual faculty members.

The importance of both the Oakes and Metz studies in the context of a discussion of the OERI research synthesis/translation activity is that the same information is likely to be received differently in the different settings. As teachers interpret the meaning of research findings, they do so in terms of their understanding of their particular job and the practices they use in their classrooms with the students they teach. Their local knowledge is formed by their context, and within that context, perspectives about students are crucial.

Barriers To Knowledge Use

The results of the OERI activity face the practical reality that there are structural and other barriers to teacher interactions that help build new meanings to frame action. The barriers include within-school divisions by grade level or department, the "egg crate" architecture of schools, and a culture that is more private than public. These organizational barriers form the first part of the discussion in this section. A second set of barriers exists because the goals embody ways of thinking about content that are likely to be unfamiliar to many teachers. The translated research information, then, will require a number of supports, both intellectual and social, to be useful and used.

Organizational barriers. Lortie (1975) and others have pointed out that teaching is essentially a solitary activity in which "teachers typically manage groups, not individuals" (Huberman, 1983, p. 491). The very structure of schools, with separate classrooms, and schedules that limit the amount of interaction among teachers, limit the ability to build new community understandings of how teachers should interact with students or curricular changes they should make. As Little (1990) puts it:

> The conventional assignment of students to individual teachers communicates a message of mutual independence among teachers. The assignment of groups of students to groups of teachers–as groups–communicates a different relationship. At issue here is the degree to which the responsibilities of teaching create perceptions of independence or interdependence, and whether the very conduct of the work breeds isolation or interaction. (p. 194)

When teachers operate collegially, however, they are more apt to produce positive effects and address problems and issues than they are under typical circumstances (Bird & Little, 1985).

The reluctance of teachers to provide critical feedback to one another is well-documented (Lortie, 1975; Cusick, 1983). The culture is one of autonomy, privacy, and equality, which is embedded in teachers' shared experience in classrooms in which there are numerous events happening simultaneously (Smith & Geoffery, 1968; Jackson, 1968), demanding the teacher's immediate attention. There is a "judge not, lest you be judged" quality to how teachers work in the same corridor or school.

Intellectual issues. The type of curriculum and instruction envisioned in Goal Three ("American students will leave grades 4, 8, and 12 having demonstrated competency in challenging subject matter...") requires teacher understanding and skills that are likely to be different from–and more difficult than–what many currently possess. The example of reform in mathematics will be

used here because of the excellent information presented by the Center for the Teaching and Learning of Elementary Subjects and the National Center for Research on Teacher Education–both OERI-funded organizations.

In California,

> State officials have been promoting substantial changes in instruction designed to deepen students' mathematical understanding, to enhance their appreciation of mathematics and to improve their capacity to reason mathematically. If successful, these reforms would be a sharp departure from existing classroom practice, which attends chiefly to computational skills (Cohen & Ball, 1990, p. 223).

The case studies of six classrooms reveal the difficulty of achieving those ends. Some of the problems are rooted in the settings in which the teachers work. Cathy, for example, "sees the framework through an instructional guide, worksheets, and mastery tests developed by the school district to accompany the textbook" especially prepared for low socioeconomic status (SES) students (Peterson, 1990, p. 264). The nature of the materials reflects district understandings about how low SES students learn and what they need to know. Her construction of a new reality is additive–students need to learn problem solving, as well as computation–rather than constructivist. Another teacher, Joe, follows different instructional practices from those recommended in the framework based on his perspectives on student abilities, but holds open the possibility of "deeper and more extensive change" because of his "great sense of accountability...to what the school district and state expect of him as a teacher" (Wiemers, 1990, p. 285).

But the cases reveal a different type of barrier to challenging students to "use their minds well," and that is the limitations of teachers' own understandings of the curriculum. The most poignant example in the study is Mark, whose instruction mainly centers on those procedural issues with which he is most comfortable. When the curriculum contains alternative procedures, he is unable to deal with them:

> I never saw that procedure before. This got really confusing...First of all, there is something about this textbook that I'm not happy with–the fact that this is the first time in my life that I've ever seen this....I'm skipping this...I'm forgetting that, and I'm going to do what I understand *because I can only teach what I understand* (Wilson, 1990, p. 294-295. Emphasis added).

And it is true that teachers are limited in their ability to teach what they do not understand, particularly when the construction of the meaning of "teacher" connotes an authority or expert, as it does in Mark's case. One barrier to constructing new meanings based on research findings, then,

is limitations of teachers' understandings of the more challenging material. Another is their construction of the meaning of "teaching."

Conclusion. The nature of the world of practice provides a framework for understanding how teachers and others within it judge the meaning and value of information. New constructions of reality, such as those contained in OERI's syntheses and translations, play a role in the building of new meanings in the practical world, within the multiple contexts and communities of that world. Differences exist between how researchers and the OERI staff responsible for the syntheses judge truth and value. Teachers are concerned with their ability to influence students within a busy and concrete world (Huberman, 1983). They, therefore, are more likely to accept new information from experience in the same sort of world than information validated by abstract statistical rules. Further, the many differences in school contexts lead to different meanings for the same events or research findings.

Conclusions and Recommendations

The conclusion offers a view of synthesis/translation that shifts the focus from "an observer construction [that] sees information as a brick to be tossed from system to person...[to] a user construction...[that] sees information as a clay to be molded and shaped by the perceiver" (Dervin, 1983, p. 174). Such a shift changes the task from one that focuses on OERI staff and activities to one that takes into account the variety of social contexts that exist in the world of practice. It could build upon the way OERI is approaching the activity internally. The following section moves from a discussion of the strength of the cross-program work groups performing the synthesis/translation task to suggest an extension of the approach. The section concludes with a brief look at the second purpose of the synthesis/translation activity: identifying "significant gaps in knowledge which, if remedied, would make it possible for schools to do an even better job of meeting the goals" (Ravitch, 1991).

The major strength of the use of cross-program work groups lies in the varied perspectives the members bring to the task. Each group includes individuals associated with basic and applied research and with improvement of practice. As these groups meet and review the findings, they will bring different understandings to the process. To create the "clearly framed statement of findings and critical understandings" (Ravitch, 1991), group members will need to share their interpretations and the rationales that lie behind them. That sharing may lead to consensus

building, but, more important, it broadens each individual's perspective on the different ways reasonable people construe the world.

It would not be a great step to include at least representatives of the research and practical worlds in the work groups. Clearly, given the multiplicity of communities and contexts in education, representation perforce will be limited. But, again, a strength of broadening involvement in the activity lies in creating ever greater numbers of educators aware of the many perspectives that frame "research into practice" and even a few that might influence "practice into research." Such collaboration might, further, alter hierarchical conceptions of research that view the teacher (if not the student!) as the lowest on the ladder.

Finally, in terms of synthesizing research for practical purposes, if information is seen as "clay," teachers and others who occupy the world of practice should be supported and appreciated as they mold it. Structures both inside and outside schools support continuous creation of new understandings based on continuous searches for ways of improving practice. OERI could become a colleague in the development and strengthening of those structures.

The synthesis/translation task has a second component, which has been ignored in this discussion. However, I want to close the paper by drawing attention to the fact that the gaps should not be identified only by checking off what we know and what would be useful for us to know. It is not merely a matter of saying, "We know how students learn x. What we need to know is how to teach teachers to teach x." Rather, the identification of gaps should take the expanded work groups into recommendations about the research base itself. As Strike and Posner (1983) state:

> *A useful synthesis should do more than summarize the state of knowledge in an area. A useful synthesis will judge the state of health of a research enterprise and suggest future directions for it.* Some such syntheses will focus on...lower order assumptions...[t]hey will suggest new ways to implement basic assumptions. Others will investigate basic assumptions themselves and will suggest new fundamental assumptions to guide research (p. 358, Authors' emphasis)

The inclusion on the work groups of those who speak from the worlds of practice can spur the questioning and alteration of basic assumptions. After all, those assumptions are constructed from the social settings in which research takes place, and those settings do not comprise the world.

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